IN THE CLAIMS

1. (Previously presented) A method of forming patterns in a semiconductor device comprising:

forming a conductive film on a substrate;

forming an anti-reflective layer on the conductive film;

cleaning oxide residues generated in forming the anti-reflective layer from the anti-reflective layer using a first cleaning solution including sulfuric acid;

cleaning the oxide residues from the anti-reflective layer using a second cleaning solution consisting essentially of SC 1;

forming a photoresist pattern on the anti-reflective layer; and

patterning the conductive film using the photoresist pattern.

2. (Original) The method of claim 1, wherein the oxide residues are generated by purging the anti-reflective layer using a purge gas including nitrogen oxide.

3. (Original) The method of claim 1, wherein the anti-reflective layer includes silicon oxide, silicon nitride or silicon oxynitride.

4. (Canceled)

5. (Previously presented) The method of claim 1, wherein cleaning oxide residues from the anti-reflective layer using the first cleaning solution including sulfuric acid is performed at a temperature of about 30 to about 70°C for about 3 to about 10 minutes.

6. (Canceled)

7. (Previously presented) The method of claim 1, wherein cleaning the oxide residues from the anti-reflective layer using the second cleaning solution including SC 1 is performed at a temperature of about 30 to about 70°C for about 5 to about 15 minutes.

8. (Previously presented) The method of claim 1, wherein the cleaning process using the first cleaning solution including sulfuric acid and the cleaning process using the second cleaning solution including SC 1 are performed in-situ.

9. (Previously presented) A method of forming patterns in a semiconductor device comprising:

forming an insulation film on a substrate;

forming a conductive film on the insulation film;

forming a hard mask layer on the conductive film;

cleaning oxide residues generated in forming the hard mask layer from the hard mask layer using a first cleaning solution including sulfuric acid;

cleaning the oxide residues from the hard mask layer using a second cleaning

solution including SC 1;

forming a photoresist pattern on the hard mask layer;

forming a hard mask by patterning the hard mask layer using the photoresist pattern; and

patterning the conductive film using the hard mask,

wherein forming the hard mask layer further comprises:

forming a first anti-reflective layer on the conductive film;

forming an oxide film on the first anti-reflective layer; and

forming a second anti-reflective layer on the oxide film.

10. (canceled)

11. (previously presented) The method of claim 9, wherein the oxide residues are generated by purging the second anti-reflective layers using a purge gas including nitrogen oxide in forming the second anti-reflective layer.

12. (previously presented) The method of claim 9, wherein the first and second anti-reflective layers include silicon oxide, silicon nitride or silicon oxynitride.

13. (previously presented) The method of claim 9, wherein a thickness ratio among the first anti-reflective layer, the oxide film and the second anti-reflective layer is about 1: 10: 2.5.

14. (Canceled)

15. (Previously presented) The method of claim 9, wherein cleaning oxide residues from the hard mask layer using the first cleaning solution including sulfuric acid is performed at a temperature of about 30 to about 70°C for about 3 to about 10 minutes.

16. (Canceled)

17. (Previously presented) The method of claim 9, wherein cleaning the oxide residues from the hard mask layer using the second cleaning solution including SC 1 is performed at a temperature of about 30 to about 70°C for about 5 to about 15 minutes.

18. (previously presented) A method of manufacturing a non-volatile memory device comprising:

forming a tunnel oxide film on a semiconductor substrate;

forming a first conductive film on the tunnel oxide film, the first conductive film being a floating gate of the non-volatile memory device;

forming an oxide/ nitride/ oxide film on the first conductive film;

forming a second conductive film on the oxide/ nitride/ oxide film, the second conductive film being a control gate of the non-volatile memory device;

forming a metal silicide layer on the second conductive film;

forming a hard mask layer on the metal silicide layer;

cleaning oxide residues generated in forming the hard mask layer from the hard

mask layer using a first cleaning solution including sulfuric acid;

cleaning the oxide residues from the hard mask layer using a second cleaning solution including SC 1;

forming a photoresist pattern on the hard mask layer;

forming a hard mask by patterning the hard mask layer using the photoresist pattern; and

patterning the metal silicide layer, the second conductive film, and the oxide/ nitride/ oxide film and the first conductive film using the hard mask,

wherein forming the hard mask layer further comprises:

forming a first anti-reflective layer on the metal silicide layer;

forming an oxide film on the first anti-reflective layer; and

forming a second anti-reflective layer on the oxide film.

19. (canceled)

20. (previously presented) The method of claim 18, wherein a thickness ratio among the first anti-reflective layer, the third oxide film and the second anti-reflective layer is about 1: 10: 2.5.

21. (previously presented) The method of claim 18, wherein the first and the second anti-reflective layers include silicon oxide, silicon nitride or silicon oxynitride, and the oxide residues are generated by purging the second anti-reflective layer using a purge gas including nitrogen oxide in forming the second anti-reflective layer.

22. (Previously presented) The method of claim 18, wherein cleaning oxide residues from the hard mask layer using the first cleaning solution including sulfuric acid is performed at a temperature of about 30 to about 70°C for about 3 to about 10 minutes.

23. (Previously presented) The method of claim 18, wherein cleaning the oxide residues from the hard mask layer using the second cleaning solution including SC 1 is performed at a temperature of about 30 to about 70°C for about 5 to about 15 minutes.

24. (Previously presented) A method of manufacturing a volatile memory device comprising:

forming a transistor structure and a pad on a semiconductor substrate;

forming an insulation film on the transistor structure and the pad;

forming an anti-reflective layer on the insulation film;

cleaning oxide residues generated in forming the anti-reflective layer from the anti-reflective layer using a first cleaning solution including sulfuric acid;

cleaning the oxide residues from the anti-reflective layer using a second cleaning solution consisting essentially of SC 1;

forming a photoresist pattern on the anti-reflective layer;

forming a contact hole exposing the pad by etching the anti-reflective layer and the insulation film using the photoresist pattern; and

forming a contact plug electrically connected to the pad in the contact hole.

25. (Original) The method of claim 24, wherein the anti-reflective layer includes silicon oxide, silicon nitride or silicon oxynitride, and the oxide residues are generated by purging the anti-reflective layer using a purge gas including nitrogen oxide.

26. (Previously presented) The method of claim 24, wherein cleaning oxide residues from the anti-reflective layer using the first cleaning solution including sulfuric acid is performed at a temperature of about 30 to about 70°C for about 3 to about 10 minutes.

27. (Previously presented) The method of claim 24, wherein cleaning oxide residues from the anti-reflective layer using the second cleaning solution including SC 1 is performed at a temperature of about 30 to about 70°C for about 5 to about 15 minutes.